

HETEROGONIC GROWTH OF RED PINE AS
AN INDEX OF SARATOGA SPITTLEBUG INJURY ^{1/}

By

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The establishment of suitable criteria for evaluating sub-clinical or subeconomic losses caused by forest insects is of paramount importance in the initiation of control activities. This is particularly true for the Saratoga spittlebug, Aphrophora saratogensis (Fitch), an insect commonly injurious to red and jack pine saplings in the Lake States.

When spittlebug populations are light, little or no twig mortality results from the adult feeding on the needle-bearing portions of sapling trees. It is only when adult populations increase that feeding causes twig killing and tree mortality. As spittlebug populations increase, and before twig mortality thresholds are reached, perceptible changes in tree form occur. Preliminary investigations were begun in 1951 to determine the feasibility of measuring these changes qualitatively.

The criterion of tree form selected to evaluate the effects of subclinical spittlebug injury to red pine was the correlation between the ratios of side branch to terminal elongation. It was reasoned that if noninjured, open-growing red pine demonstrated a heterogonic growth pattern which was constant in all soil types from season to season and in all parts of the region, spittlebug injury would be reflected by the magnitude of the deviation or disturbance in the growth pattern.

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Heterogonic growth patterns were derived for noninjured red pine by plotting the ratio of lateral to terminal elongation for each season against its corresponding whorl year. In these investigations, 10 trees per sample were selected on which 3 branches in each whorl were carefully measured. The coefficient of correlation analysis indicated a highly significant negative linear relationship constant from season to season over a wide area of north-central Michigan. Coefficients of correlation ranged from 0.955 to 0.999; regression coefficients from 0.072 to 0.116.

Analysis of data from nonflagged red pine in plantations containing large numbers of flagged trees revealed a drastic deterioration in both correlation and regression coefficients. Examination of these data for years leading up to the season preceding flagging injury revealed the progressive nature of this form deterioration. When spittlebug-injured trees were sprayed to control the adult population, this deterioration was abruptly halted and a return toward normalcy occurred the following season.

Although these studies are of a preliminary nature, it is hoped that this method may ultimately be employed to show the initiation of spittlebug population increased, to predict the degree of injury sustained, and to correlate spittlebug populations with subclinical and economic injury.

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Subject: Report by Benjamin

We are enclosing a copy of Benjamin's paper, "Heterogonic growth of red pine as an index of Saratoga spittlebug injury", recently requested by Mr. Callahan.

A detailed report, outlining the project in its entirety, is in preparation and will be circulated at a later date. For the present, the term, "heterogonic", has been deleted from the title and text of the report for technical reasons.

H. J. MacAloney

